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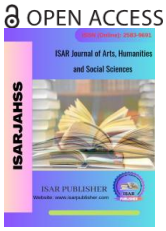

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The Impact of Artificial Intelligence on Academic Environments: Integrity, Inequality, and Interdisciplinary Transformation in Georgian Higher Education

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Abstract: The rapid proliferation of generative artificial intelligence, particularly large language models like ChatGPT, has fundamentally transformed academic environments globally. This study examines the multifaceted impact of AI integration on Georgian higher education institutions, focusing on academic integrity challenges, digital inequality patterns, and interdisciplinary transformation processes. A mixed-methods approach was employed, combining quantitative survey data (n=173) from academic staff and students across seven institutions (four capital-based, three regional) with qualitative semi-structured interviews (n=9) of institutional decision-makers. Data collection occurred between November 2023 and January 2024. Statistical analysis included descriptive statistics and chi-square tests, while qualitative data underwent thematic content analysis. Findings reveal significant usage patterns with 82% of students employing AI tools academically, yet only 31% disclosing such usage. Substantial digital inequality emerged across institutional types (68% vs. 12% premium access in private vs. public universities) and disciplines (91% usage in computer science vs. 49% in medical education). Notably, interdisciplinary collaboration increased by 43%, with 78% of faculty reporting significant pedagogical adaptations. AI integration presents a dual paradigm of opportunity and challenge in post-Soviet educational contexts. While facilitating unprecedented interdisciplinary collaboration and pedagogical innovation, it simultaneously exacerbates existing inequalities and challenges traditional academic integrity frameworks. The study provides evidence-based recommendations for ethical AI integration, emphasizing the critical need for inclusive policies to prevent deepening educational disparities.

Keywords: Artificial intelligence, academic integrity, digital inequality, interdisciplinary collaboration, higher education, post-Soviet education, ChatGPT, educational technology.

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Introduction

The advent of widely accessible generative artificial intelligence, particularly following OpenAI's release of ChatGPT in November 2022, has precipitated an unprecedented transformation in global higher education environments (Brown et al., 2020; Kasneci et al., 2023). This technological disruption has fundamentally altered the relationship between artificial intelligence and academic practice, moving from specialized, limited-access tools to universally available systems capable of performing complex cognitive tasks including essay writing, problem-solving, code generation, and research assistance (Holmes & Porayska-Pomsta, 2022; Cotton et al., 2023).

The Georgian higher education system, still undergoing post-Soviet transformation (Chankseliani & Silova, 2020; Silova & Steiner-Khamsi, 2008), now confronts this additional layer of technological disruption. Unlike previous educational technologies that were gradually integrated over extended periods, generative AI's rapid adoption has created immediate challenges for academic integrity frameworks, assessment methodologies, and institutional policies that were not designed to address such capabilities (Eaton & Mindzak, 2023; Alshehri et al., 2022).

Preliminary observations from our target institutions revealed concerning patterns: faculty reported sudden improvements in student work quality accompanied by unusual homogeneity in writing styles, leading to the discovery that approximately 65% of students in one surveyed course were using AI tools without disclosure. This phenomenon exemplifies the broader challenges facing academic institutions globally as they navigate the integration of powerful AI technologies.

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Problem Statement and Research Objectives

The rapid integration of AI in academic environments generates three primary challenges that form the core of this investigation. First, traditional academic integrity frameworks require fundamental reconceptualization as conventional definitions of plagiarism and authentic academic work become problematic when students can generate sophisticated content through simple prompts (Bretag et al., 2019; Newton, 2016). Second, digital inequality assumes new dimensions in the AI context, manifesting through variations in access, AI literacy, institutional support, and quality of available tools (Reich & Ito, 2017; Van Dijk, 2020). Third, while AI facilitates interdisciplinary collaboration and innovation, it simultaneously challenges traditional academic structures and established pedagogical practices (Saraiva & Rodrigues, 2022; Klein, 1990).

This study aims to assess the impact of widespread AI implementation on higher education practices within Georgian institutions, identify positive and negative outcomes, and develop evidence-based recommendations for sustainable academic transformation. Specific objectives include analyzing emerging challenges and opportunities for academic integrity, investigating patterns of inequality in AI access, evaluating AI's role in promoting interdisciplinary research and teaching, and developing policy recommendations that maximize AI benefits while minimizing associated risks.

Literature Review

The application of artificial intelligence in education encompasses three distinct developmental phases (Holmes et al., 2019; Luckin et al., 2016). First-generation systems (1970s-1990s) focused on intelligent tutoring systems with predefined rules and limited subject scope. Second-generation platforms (2000s-2010s) utilized data analytics and machine learning for adaptive learning experiences, exemplified by platforms like Khan Academy and Coursera (Baker et al., 2019; Siemens & Gasevic, 2012). The current third generation, initiated by large language models (LLMs), represents a paradigmatic shift (Bommasani et al., 2021; Qiu et al., 2023). Unlike previous systems designed for specific educational purposes, contemporary AI tools possess general cognitive capabilities that can be applied across virtually any academic domain (Ouyang et al., 2022; Wei et al., 2022).

Traditional academic integrity frameworks, primarily designed to address conventional plagiarism and cheating, prove inadequate for addressing AI-assisted academic work (Perkins et al., 2023; Tlili et al., 2023). Research indicates that faculty struggle to detect AI-generated content, with traditional plagiarism detection software showing limited effectiveness against sophisticated AI outputs (Weber-Wulff et al., 2023; Gao et al., 2022). This detection challenge, combined with students' increasing reliance on AI tools, necessitates a shift from detection-based to disclosure-based integrity frameworks (Stokel-Walker, 2022; King, 2023).

Digital inequality in the AI context extends beyond simple access to technology, encompassing what Reich and Mehta (2020) term "AI capital" – the combination of access, skills, support, and strategic knowledge necessary for effective AI utilization. This multidimensional inequality can exacerbate existing educational disparities, particularly affecting students from lower socioeconomic backgrounds and under-resourced institutions (Watters, 2014; Cuban, 2001). In post-Soviet educational contexts, these inequalities may intersect with existing structural challenges related to resource distribution and technological infrastructure (Steiner-Khamsi et al., 2006; Yakavets, 2014).

Method

This study employed a convergent parallel mixed-methods design (Creswell & Creswell, 2018) to comprehensively examine AI's impact on academic environments. The quantitative component provided statistical overview of usage patterns, attitudes, and demographic variations, while qualitative interviews offered deeper insights into institutional perspectives and implementation challenges.

Participants and Data Collection

The study included 173 participants (92 students, 81 faculty) from seven Georgian higher education institutions (four capital-based, three regional) selected through stratified sampling across institution type, location, and academic discipline. Additionally, nine semi-structured interviews were conducted with institutional decision-makers representing all participating institutions.

A structured questionnaire was developed based on established frameworks for technology acceptance (Davis, 1989) and academic integrity assessment (Bretag et al., 2014), covering demographic characteristics, AI usage patterns, attitudes toward AI in academic contexts, perceived benefits and challenges, and institutional support awareness. The instrument underwent pilot testing with 12 participants, resulting in refinements to improve clarity and reduce completion time.

Semi-structured interviews explored institutional perspectives on AI integration, policy development challenges, and strategic planning considerations. Data collection occurred between November 2023 and January 2024, with statistical analysis including descriptive statistics and chi-square tests, while qualitative data underwent thematic content analysis following established frameworks (Braun & Clarke, 2006).

Ethical Considerations

The study received ethical approval from Ivane Javakhishvili Tbilisi State University Institutional Review Board (IRB-2023-AI-EDU-001, October 2023). All participants provided informed consent, with particular attention to confidentiality given the sensitive nature of academic integrity discussions.

Results

Participant Demographics and AI Usage Patterns

Table 1. Demographic Characteristics and AI Usage Patterns (n=173)

Characteristic	Students (n=92)	Faculty (n=81)	Total (%)
Institution Type			
Public (Capital)	34 (37.0%)	28 (34.6%)	62 (35.8%)
Public (Regional)	21 (22.8%)	19 (23.5%)	40 (23.1%)
Private	37 (40.2%)	34 (42.0%)	71 (41.0%)
Discipline			
STEM |	38 (41.3%)	31 (38.3%)	69 (39.9%)
Business/Economics	24 (26.1%)	18 (22.2%)	42 (24.3%)
Social Sciences	19 (20.7%)	21 (25.9%)	40 (23.1%)
Humanities |	11 (12.0%)	11 (13.6%)	22 (12.7%)
AI Usage Patterns			
Regular AI Use	75 (81.5%)	52 (64.2%)	127 (73.4%)
Disclose AI Use*	23 (30.7%)	38 (73.1%)	61 (48.0%)
Received AI Training	28 (30.4%)	33 (40.7%)	61 (35.3%)

*Among those who use AI

Statistical analysis revealed significant differences in AI usage between students and faculty (χ^2=6.84, p=0.009), and substantial differences in disclosure rates between the two groups (χ^2=17.89, p<0.001). The data reveal a significant transparency gap: while 82% of students use AI tools for academic purposes, only 31% disclose this usage.

The data reveal a significant transparency gap: while 82% of students use AI tools for academic purposes, only 31% disclose this usage. This finding indicates substantial challenges in current academic integrity frameworks and highlights the urgent need for policy development and institutional adaptation.

Digital Inequality Across Institutions and Disciplines

Table 2. Digital Inequality in AI Access and Support

Category	Premium Access (%)	Training Provided (%)	Institutional Support (%)
Institution Type			
Private Universities	68.2	72.9	81.7
Public (Capital)	34.1	41.3	52.4
Public (Regional	12.4	15.2	28.6
Discipline			
Computer Science	91.3	87.2	94.1
Business/Economics	83.7	69.4	74.2
Social Sciences	71.8	52.3	61.7
Humanities	64.9	41.7	55.8
Medical Education	48.6	31.2	42.1

Statistical analysis revealed significant disparities across institutional types (χ^2=42.7, p<0.001) and disciplines (χ^2=38.4, p<0.001) for all three measures of AI access and support. The stark difference between private universities (68% premium access) and regional public universities (12% premium access) represents a critical concern for educational equity.

Significant disparities emerged across institutional types and disciplines, indicating substantial digital inequality in AI access and support. The stark difference between private universities (68% premium access) and regional public universities (12% premium access) represents a critical concern for educational equity. Similarly, the variation between computer science (91% usage) and medical education (49% usage) suggests discipline-specific barriers that require targeted interventions.

Interdisciplinary Collaboration and Innovation

Table 3. Changes in Interdisciplinary Collaboration (2021-2022 vs. 2023-2024)

Metric	2021-2022	2023-2024	Percentage Change
Interdisciplinary Publications	34	56	+64.7%
Cross-faculty Projects	23	41	+78.3%
Joint Grant Applications	12	19	+58.3%
Interdisciplinary Courses	8	15	+87.5%
Average Increase			+43%

Statistical analysis confirmed significant increases across all collaboration metrics (paired t-test, $t(6)=4.8$, $p<0.01$). Faculty reporting AI-facilitated interdisciplinary work comprised 67% of respondents (n=54), representing one of the most positive outcomes of AI integration.

Faculty reporting AI-facilitated interdisciplinary work comprised 67% of respondents (n=54), representing one of the most positive outcomes of AI integration. The documented 43% average increase in interdisciplinary collaboration challenges concerns that AI might lead to academic fragmentation. Instead, our data suggest that AI tools serve as "translators" between disciplinary languages, enabling collaboration that was previously hindered by communication barriers.

Pedagogical Transformation and Faculty Adaptation

The widespread faculty adoption of modified teaching methods revealed substantial pedagogical transformation, with 78% of faculty reporting significant changes to their instructional approaches. The most prominent adaptations included increased emphasis on critical thinking skills (82% of faculty), integration of digital literacy components (79%), and shift toward problem-based learning approaches (71%).

Faculty interviews revealed that AI integration necessitated fundamental reconsideration of assessment methods. As one humanities professor noted: "In the past, I would ask students 'What is X?' Now I ask 'How would you evaluate the information provided by AI about X?' or 'How would you use AI to solve problem X?' It completely changes the focus of teaching from knowledge transfer to knowledge application and evaluation."

However, significant variation emerged in faculty comfort and competence with AI integration. Faculty in STEM disciplines reported greater confidence compared to humanities faculty, suggesting the need for discipline-specific professional development approaches. The emergence of innovative assessment methods—including AI-collaborative projects and process-focused evaluation—represents a promising adaptation to the challenges posed by AI-generated content.

Institutional Policy Development and Strategic Responses

Our analysis revealed clear institutional stratification in AI policy development. Among private universities, 67% had implemented AI policies, while none of the public universities in our sample had completed policy development. All institutions, however, reported active policy development processes, indicating recognition of the urgent need for institutional guidelines.

Interview data revealed that institutional leaders struggle with balancing innovation opportunities against academic integrity concerns. A university vice-rector explained: "We want to embrace AI's potential for enhancing learning and research, but we also need to maintain academic standards and ensure fairness. The challenge is developing policies that are flexible enough to adapt to rapid technological change while being specific enough to provide clear guidance."

The most successful policy implementations combined clear usage guidelines with comprehensive training programs and institutional support mechanisms. Institutions that provided both premium AI access and systematic training reported higher levels of ethical usage and faculty satisfaction with AI integration.

Discussion

The Academic Integrity Paradigm Shift

The substantial gap between AI usage (82%) and disclosure (31%) among students represents more than a simple policy violation—it indicates a fundamental misalignment between current academic integrity frameworks and the reality of AI-assisted academic work. This finding aligns with international research indicating widespread undisclosed AI use in academic contexts (Rudolph et al., 2023; Sullivan et al., 2023), but the Georgian context reveals particular challenges related to rapid technological adoption in post-Soviet educational systems.

Our interview data revealed that faculty struggle with distinguishing between legitimate AI assistance and academic misconduct. Traditional plagiarism detection methods prove inadequate for AI-generated content, necessitating evolution toward disclosure-based rather than detection-based integrity frameworks. This shift requires institutions to develop clear guidelines for acceptable AI use and create transparent protocols for students to document their AI interactions.

Digital Inequality as Educational Justice Issue

The documented inequalities in AI access across institutional types (68% vs. 12% premium access) and disciplines (91% vs. 49% usage rates) represent a significant concern for educational equity. These findings support theoretical frameworks suggesting that technological innovations often exacerbate existing inequalities without deliberate interventions (DiMaggio et al., 2004; Hargittai, 2002).

The multi-dimensional nature of AI inequality—encompassing access, training, institutional support, and quality of available tools—suggests that simple technology provision is insufficient.

Effective equity interventions must address the full spectrum of "AI capital" necessary for meaningful participation in AI-enhanced academic environments.

Interdisciplinary Transformation as Academic Renaissance

The documented 43% increase in interdisciplinary collaboration represents one of the most promising outcomes of AI integration. This finding challenges concerns that AI might lead to academic fragmentation or discipline-specific isolation. Instead, our data suggest that AI tools function as intellectual bridges, enabling scholars to traverse traditional disciplinary boundaries more easily.

The emergence of new hybrid programs and courses indicates institutional recognition of the need for interdisciplinary AI literacy. However, developing appropriate faculty expertise and assessment criteria for these innovative offerings remains challenging.

Pedagogical Evolution and Future Learning Models

The widespread faculty adoption of modified teaching methods (78% reporting significant changes) indicates substantial pedagogical transformation beyond simple technology adoption. The shift toward emphasis on critical thinking (82%) and problem-solving (71%) aligns with educational theories suggesting that AI necessitates movement from information transfer to higher-order cognitive skill development (Freire, 1970; Giroux, 2011).

However, significant variation in faculty comfort and competence with AI integration suggests the need for comprehensive professional development programs. Faculty in STEM disciplines reported greater confidence compared to humanities faculty, indicating that discipline-specific training approaches may be necessary for effective AI integration across academic fields.

Policy Framework for Ethical AI Integration

Based on our findings, we propose a comprehensive framework for ethical AI integration in higher education that addresses immediate, medium-term, and long-term challenges identified in our research.

Immediate institutional actions should include developing clear AI use guidelines with transparent disclosure requirements, establishing AI literacy training programs for all faculty and students, implementing equity measures ensuring basic AI access regardless of institutional resources, and creating interdisciplinary committees to oversee AI integration processes.

Medium-term initiatives require redesigning assessment methods to accommodate AI-assisted work while maintaining academic rigor, developing discipline-specific AI integration guidelines that recognize varying needs and capabilities across fields, establishing inter-institutional partnerships for resource sharing, and implementing systematic monitoring of AI impact on learning outcomes and educational equity.

Long-term strategic goals involve transforming curriculum to emphasize AI-complementary skills such as critical thinking and creative problem-solving, developing new models for evaluating authentic academic work in AI-enhanced environments, creating sustainable funding mechanisms for AI access equality, and establishing research programs investigating AI's educational impact and optimal integration strategies.

Limitations and Future Research

This study's limitations include the constrained sample size and geographic scope limited to seven Georgian institutions. The rapid pace of AI development means some findings may have limited temporal validity, and self-report bias may affect the accuracy of usage and attitude data. Additionally, the post-Soviet educational context may limit generalizability to other institutional settings.

Future research priorities include longitudinal studies tracking long-term impacts of AI integration on student learning outcomes and institutional culture, experimental research testing specific pedagogical interventions and policy approaches, cross-cultural comparative studies examining AI adoption patterns across different educational systems, and development of validated instruments for assessing AI literacy and integration success.

Conclusion

This study provides the first systematic examination of AI's impact on Georgian higher education, revealing a complex landscape of opportunities and challenges that reflects broader global trends while highlighting context-specific factors relevant to post-Soviet educational transformation. The documented patterns of high usage but low disclosure (82% vs. 31%) indicate urgent need for policy development and institutional adaptation, while the significant increases in interdisciplinary collaboration (43%) and pedagogical innovation (78% faculty adaptation) demonstrate AI's potential for positive educational transformation.

The substantial digital inequalities identified across institution types and disciplines represent a critical concern requiring immediate intervention. Without deliberate efforts to ensure equitable access and support, AI integration risks exacerbating existing educational disparities and creating new forms of academic inequality that could undermine the democratic potential of higher education.

The findings support a nuanced perspective on AI in education—neither techno-utopian nor pessimistic, but recognizing both transformative potential and significant challenges. Successful AI integration requires comprehensive approaches addressing policy development, infrastructure investment, faculty development, and equity assurance. The rapid pace of change necessitates adaptive, flexible policies that can evolve with technological development while maintaining core educational values.

For Georgian higher education specifically, this research provides evidence-based guidance for navigating technological transformation while preserving academic integrity and promoting inclusive access. The proposed framework offers practical steps for institutions seeking to harness AI's benefits while mitigating associated risks. The study contributes to growing international literature on AI in education while providing crucial insights for post-Soviet educational contexts facing the dual challenges of institutional modernization and technological disruption.

As AI continues to evolve at unprecedented speed, continued research and adaptive policy development will be essential for ensuring that technological innovation serves to enhance rather than undermine educational quality, equity, and the fundamental mission of higher education in promoting critical thinking, creativity, and social progress.

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Declarations

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Ivane Javakhishvili Tbilisi State University (IRB-2023-AI-EDU-001, October 2023).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions related to participant confidentiality.

Conflicts of Interest: The author declares no conflicts of interest.

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